

1           1.    A multiuser DSSS-OFDM multiband of UWB base  
2 station communication transmitter comprising:  
3               a multiuser encoding and spreading unit;  
4               a polyphase-based multiband;  
5               a IFFT unit;  
6               a filtering unit, and  
7               a multiband-based modulation and multicarrier.

8           2.    The multiuser DSSS-OFDM multiband of UWB base  
9 station communication transmitter of claim 1 wherein said  
10 multiuser encoding and spreading unit includes an N-user  
11 bitstream, a N-convolution encoder, a N-interleaver, a N-  
12 spread multiplier, and a N-user key sequence.

13          3.    The multiuser DSSS-OFDM multiband of UWB base  
14 station communication transmitter of claim 2 wherein said  
15 N-user key sequence is orthogonal each other.

16          4.    The multiuser DSSS-OFDM multiband of UWB base  
17 station communication transmitter of claim 3 wherein a  
18 cross-correlation between one user key sequence and other  
19 user key sequences is almost equal to zero value.

20          5.    The multiuser DSSS-OFDM multiband of UWB base  
21 station communication transmitter of claim 1 wherein said  
22 polyphase-based multiband includes ten sample delays,

23 eleven down samples, eleven RAM memories, and one modular  
24 counter.

25         6.     The multiuser DSSS-OFDM multiband of UWB base  
26 station communication transmitter of claim 5 wherein said  
27 polyphase-based multiband converts an N length of serial  
28 sequence into eleven multiband sequences with a length of  
29  $N/11$ .

30         7.     The multiuser DSSS-OFDM multiband of UWB base  
31 station communication transmitter of claim 1 wherein said  
32 IFFT unit includes eleven IFFTs in parallel, each of the  
33 IFFTs having 24 Nulls and 512 complex inputs to produce  
34 1024 real-value output.

35         8.     The multiuser DSSS-OFDM multiband of UWB base  
36 station communication transmitter of claim 1 wherein said  
37 filter unit includes eleven filtering sections, each  
38 filtering section having a dual-switch, two transmitter  
39 shaped filters, two D/A converters, two analog  
40 reconstruction filters, and one bit detector.

41         9.     The multiuser DSSS-OFDM multiband of UWB base  
42 station communication transmitter of claim 8 wherein said  
43 dual-switch contains two switches, one switch of rotating

44 at even number of input positions and another switch of  
45 rotating at odd number of input positions.

46 10. The multiuser DSSS-OFDM multiband of UWB base  
47 station communication transmitter of claim 8 wherein said  
48 bit detector identifies a value of the dual switch output.

49 11. The multiuser DSSS-OFDM multiband of UWB base  
50 station communication transmitter of claim 1 wherein said  
51 multiband-based modulation and multicarrier includes eleven  
52 multiband QPSK modulations controlled by eleven bit  
53 detectors, one summation, and one analog bandpass filter.

54 12. The multiuser DSSS-OFDM multiband of UWB base  
55 station communication transmitter of claim 11 wherein said  
56 each multiband QPSK modulation and multicarrier includes a  
57 multi-oscillator, two oscillator switches and one QPSK  
58 switch controlled by the bit detector, and one up-carrier  
59 multiplier and one down-carrier multiplier.

60 13. The multiuser DSSS-OFDM multiband of UWB base  
61 station communication transmitter of claim 12 wherein said  
62 multi-oscillator contains four carriers of positive and  
63 negative  $\sin(2\pi f_i t)$ , and positive and negative  $\cos(2\pi f_i t)$ .

64           14. The multiuser DSSS-OFDM multiband of UWB base  
65 station communication transmitter of claim 12 wherein said  
66 one of the two oscillator switches connects to either the  
67 positive  $\cos(2\pi f_i t)$  or the negative  $\cos(2\pi f_i t)$ ; another of the  
68 two oscillator switches connects to either the negative  
69  $\sin(2\pi f_i t)$  or the positive  $\sin(2\pi f_i t)$ .

70           15. The multiuser DSSS-OFDM multiband of UWB base  
71 station communication transmitter of claim 12 wherein said  
72 QPSK switch either connects to the up-carrier multiplier or  
73 connects to the down-carrier multiplier.

74           16. A multiuser DSSS-OFDM multiband of UWB mobile  
75 communication receiver comprising:  
76                 a combination section of a multiband multicarrier  
77 down converter and demodulation, an A/D unit, and a digital  
78 receiver filter unit;  
79                 a FFT and FEQ section;  
80                 a polyphase-based demultiband; and  
81                 a despreading, deinterleaver and decoding  
82 section.

83           17. The multiuser DSSS-OFDM multiband of UWB mobile  
84 communication receiver of claim 16 wherein said combination  
85 section of a multiband multicarrier down converter and  
86 demodulation, an A/D unit, and a digital receiver filter

87 unit includes an analog bandpass filter, eleven multiband  
88 QPSK down converters and demodulations, twenty-two A/D  
89 converters, and twenty-two digital receiver filters.

90 18. The multiuser DSSS-OFDM multiband of UWB mobile  
91 communication receiver of claim 16 wherein said each of the  
92 multiband QPSK down converters and demodulations include an  
93 up-level carrier multiplier of  $\cos(2\pi f_i t)$  coupled to an anti-  
94 aliasing analog filter and a down-level carrier multiplier  
95 of  $\sin(2\pi f_i t)$  coupled to an anti-aliasing analog filter.

96 19. The multiuser DSSS-OFDM multiband of UWB mobile  
97 communication receiver of claim 16 wherein said FFT and FEQ  
98 section includes eleven FFT units and eleven FEQ units.

99 20. The multiuser DSSS-OFDM multiband of UWB mobile  
100 communication receiver of claim 19 wherein said each FFT  
101 unit has 1024 real-value inputs and produces 500 outputs in  
102 the frequency-domain and 12 Nulls.

103 21. The multiuser DSSS-OFDM multiband of UWB mobile  
104 communication receiver of claim 19 wherein said each FEQ  
105 unit includes 500 equalizers, 500 decision detectors, 500  
106 subtracts, and an adaptive algorithm.

107           22. The multiuser DSSS-OFDM multiband of UWB mobile  
108 communication receiver of claim 21 wherein said each of  
109 equalizers is a linear equalizer with N-tap adjustable  
110 coefficients.

111           23. The multiuser DSSS-OFDM multiband of UWB mobile  
112 communication receiver of claim 21 wherein said each of the  
113 decision detectors is a multi-level threshold.

114           24. The multiuser DSSS-OFDM multiband of UWB mobile  
115 communication receiver of claim 16 wherein said polyphase-  
116 based demultiband includes a modular counter, eleven RAM  
117 memories, eleven up samples, ten sample delays, and a  
118 addition.

119           25. The multiuser DSSS-OFDM multiband of UWB mobile  
120 communication receiver of claim 24 wherein said polyphase-  
121 based demultiband converts eleven multiband input sequences  
122 with a length of  $N/11$  into a serial output sequence with a  
123 length of  $N$ .

124           26. The multiuser DSSS-OFDM multiband of UWB mobile  
125 communication receiver of claim 16 wherein said  
126 despreading, deinterleaver and decoding section includes a  
127 despreading multiplier, a user key sequence, a  
128 deinterleaver, a Viterbi decoding, and a user bitstream.

129           27. A multiuser DSSS-OFDM multiband of UWB  
130     communication system comprises a multiuser DSSS-OFDM  
131     multiband of UWB base station communication transmitter and  
132     receiver, and N different users of the DSSS-OFDM multiband  
133     of UWB mobile communication transmitters and receivers;

134           28. The multiuser DSSS-OFDM multiband of UWB  
135     communication system of claim 27 wherein said multiuser  
136     DSSS-OFDM multiband of UWB base station communication  
137     transmitter and receiver can transmit and receive N  
138     different users simultaneously.